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EXAMINER

NGUYEN, STEVEN H D

| ART UNIT | PAPER NUMBER |
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2665

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DATE MAILED: 07/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/755,670

Applicant(s)

OBERMAN ET AL.

Examiner

Steven HD Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 January 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16, 18, 20-25, 28-37, 39-45, 48, 51, 52 and 54 is/are rejected.
- 7) ☒ Claim(s) 15, 17, 19, 26, 27, 38, 46, 47, 49, 50 and 53 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>2</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claim 14 objected to because of the following informalities: "dest1tination" must be changed to -- destination --. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 4, 20-21 and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As claim 4, "said reading" is vague and indefinite because it does not refer to any previous elements.

As claims 20-21, "the sufficient amount of data" is vague and indefinite because it does not refer to any previous elements. These claims should be depended on claim 19.

As claim 29, "the crossbar switch" is vague and indefinite because it does not refer to any previous elements. These claims should be depended on claim 28.

There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-5, 10, 12-14, 16, 22-23, 28-29, 31, 41-44 and 51 are rejected under 35

U.S.C. 102(b) as being anticipated by Hochschild (USP 5546391).

Regarding claims 1 and 13, Hochschild disclose (Figs 1,10 and col. 1, lines 12 to col. 28, lines 17) a method for switching packets in a network switch, the method comprising receiving data forming a packet, wherein the packet is to be routed to at least one destination output port of a plurality of output ports (Fig 3, Ref 380) that are part of the network switch (Fig 3, Ref 251); determining whether the destination output port has sufficient resources available to handle the data without causing an overflow (Col. 15, lines 24-57); routing the data to the destination output port if sufficient resources are available (Col. 12, lines 48 to col. 13, lines 44); and if sufficient resources are not available; storing the data to a random access memory (Col. 13, lines 45-51); waiting until the destination output port has sufficient resources available; and transferring the data from the random access memory to the destination output port (Col. 14, lines 57-59).

Regarding claims 14 and 41-42, Hochschild discloses (Figs 1,10 and col. 1, lines 12 to col. 28, lines 17) a network switch (Fig 3) comprising a plurality of input ports configured to receive data forming one or more packets (Fig 3A, Ref 310); a plurality of output ports configured to convey the packets out of the switch (Fig 3A, 380); a random access memory (Fig 3A, Ref 350); and data transport logic coupled between the input ports, the output ports, and the memory (Fig 3A, Ref 315, 312, 360), wherein a first input port is configured to request cut-through routing from at least one destination output port in response to receiving data

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corresponding to a first packet that is a candidate for cut-through routing, wherein the destination output port is configured to convey a signal granting cut-through to the first input port if the destination output port has sufficient resources available to handle the data corresponding to the first packet, wherein, in response to receiving the grant cut-through signal, the input port is configured to route the data corresponding to the first packet to the destination output port via the data transport logic (Col. 12, lines 47 to col. 13, lines 44, the input port receives a packet and generates a request for forwarding the packet to output port. After receiving a grant signal from output port, the receiver will route the packet via a crosspoint switch to the output port by bypass the central queue), and wherein in response to not receiving the grant cut-through signal, the input port is configured to store the data to the shared memory via the data transport logic (Col. 13, lines 45-51, the input port does not receive a grant signal will forward the packet to the central queue), wherein the output port is configured to read the data corresponding to the first packet from the shared memory via the data transport logic in response to having resources available for the data corresponding to the first packet (Col. 13, lines 52-64, the output port will read the stored data in the central queue when it is available; col. lines 57-59).

Regarding claims 2-3 and 43-44, Hochschild inherently discloses said routing is started before said receiving is complete to implement cut-through routing or early forwarding (the message is routed when input fifo receives 8 byte message from the link wherein chunk is used for wormhole routing "cut through").

Regarding claim 4, Hochschild inherently discloses said reading is started after said storing is complete to implement store and forward routing (Central queue stores the message packet if the output port is not available in order to implement store and forward routing).

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Regarding claim 5, Hochschild discloses said routing is performed without storing the data in an intervening random access memory (col. 13, lines 19-20).

Regarding claim 10, Hochschild discloses said transferring the data from the random access memory to the destination output port is performed once for each output port that is a destination for the packet (Col. 14, lines 58-60).

Regarding claim 12, Hochschild discloses said storing comprises allocating clusters to the data, wherein each cluster comprises one or more cells, wherein each cell comprises a number of bytes equal to the width of the random access memory's interface (Col. 4, lines 29-47, memory interface is 8 byte width, Chunk reads on cell).

Regarding claim 16, Hochschild discloses each input port comprises an input port FIFO, wherein each output port comprises an output FIFO, wherein the input FIFO is configured to store received data until the received data is routed to the output FIFO or the random access memory (Fig 1, Ref 350 is memory and Ref 410 is input FIFO and Ref 420 is output FIFO for using to store the data).

Regarding claim 22, Hochschild discloses the input port is configured to store the data to the shared memory via the data transport logic in cells (Col. 4, lines 29-47, memory interface is 8 byte width, Chunk reads on cell).

Regarding claims 23 and 51, Hochschild discloses the input port is configured to allocate one or more clusters for each received packet, wherein each cluster comprises one or more cells, wherein each cell equals the size of the random access memory's interface (Col. 4, lines 29-47, memory interface is 8 byte width, Chunk reads on cell).

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Regarding claims 28-29, Hochschild discloses the data transport logic includes a cross-bar switch configurable to route data from each input port to each output port and prevent data from a particular input port being routed back to the particular input port. (Fig 3a, Ref 360).

Regarding claim 31, Hochschild discloses the packets have variable lengths (Col. 10, lines 26-41).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 6-9, 20-21, 24-25, 32-37, 39, 48 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hochschild in view of Herring (USP 6542502).

Regarding claims 6 and 7, Hochschild fails to fully disclose the claimed invention. However, the examiner take official notice that a method and system for storing the data received in the destination output port in an output first in first out memory (FIFO); and determining whether the output FIFO has a predetermined amount of available storage space before performing said storing, wherein said predetermined amount of available storage space is stored in a programmable register and is a function of the maximum packet size is well known and expected in the art at the time of invention was made to apply a method of determining if the available buffer space before storing or discard the information in order to reduce the processing time of the buffer.

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Regarding claim 8, Hochschild fails to fully disclose the claimed invention. However, the examiner take official notice that a method and system for creating and storing a packet descriptor for the packet, wherein the packet descriptor is stored in a linked list is well known in the art at the time invention was made to apply a linked list in order to link the sequence of the received packet and performing first in first out.

Regarding claim 9, Hochschild fails to disclose said routing the data is performed to all output ports simultaneously that are destinations for the packet and that have sufficient resources available. In the same field of endeavor, Herring discloses a method and apparatus for routing data simultaneously to the destination ports that have available resources (See col. 4, lines 25-38).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to apply a method and system for replicating a packet from input port to the output ports simultaneously as disclosed by Herring's system and method into Hochschild's system. The motivation would have been to prevent a dead lock in the system.

Regarding claims 20-21, Hochschild fails to disclose the claimed invention. However, the examiner takes an official notice that a method and system for assigning the sufficient amount of data on a port-by-port basis and a function of the output port's line rate is well known and expected in the art. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to assign a threshold on each port into Hochschild's system in order to prevent data loss.

Regarding claims 24-25 and 48, Hochschild fails to fully disclose each output port comprises an output FIFO, wherein each output port is configured to refrain from conveying the

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signal granting cut-through in response to the output port's output FIFO having less than a predetermined number of bytes of available storage or being more than a predetermined percentage full. However, Hochschild discloses when FIFO or Queue has no space to store the chunk; the chunks will not be transmitted from input FIFO or central queue to the output FIFO (See col. 41-52). Therefore, it would have been obvious to one of ordinary skill in the art to implement a method and system for prevent the output port to generate a grant signal when the buffer space is less than a threshold into Hoshschild's in order to prevent data loss because this method and system is well known and expected in the art.

Regarding claims 34-37, 39 and 52, Hochschild fails to disclose said switch is configurable to disable cut-through routing or early forwarding on a port-by-port basis or a packet-by-packet basis or selectively disable cut-through operations from a particular type of input port to a particular type of output port. However, the examiner takes an official notice that a method and system for disabling cut through based on port, packet are well known and expected in the art such as disable cut through based on packet by packet to prevent packet error, port in order to prevent an over load on an output port when input port is high speed than the input port.

Regarding claims 32-33, Hochschild fails to disclose said input port is configured to generate a packet descriptor for each received packet, wherein the packet descriptor comprises at least the length of the corresponding packet and an identifier that identifies the corresponding output port to which the packet is to be routed and an indication of the packet's priority. However, the examiner take official notice that a method and system for generating a descriptor which includes priority, identify and length is well known and expected in the art at the time of

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invention was made to create a list for using to read data from buffer in order to prevent a dead lock.

8. Claims 11, 18, 30, 40, 45 and 54 are rejected under 35 U.S.C. 103(a) as being obvious over Hochschild in view of Latif (USP 6400730).

9. The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Regarding claim 11, Hochschild fails to disclose the claimed invention. However, Latif discloses said switching the packet comprises encapsulating the packet in a Storage Over IP

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(SOIP) packet if the packet is a Fibre Channel packet and the output port is an Ethernet port (Fig 6A).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to apply a method and system for encapsulating Fibre packet into Ethernet Packet as disclosed by Latif's system into Hochschild's system. The motivation would have been to use the Ethernet network for conveying the Fibre channel packet.

Regarding claims 18 and 45, Hochschild fails to disclose the claimed invention. However, Latif discloses one or more of the input ports and one or more of the output ports operate at different data rates (Fig 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to apply a method and system having the different rate ports at a switch as disclosed by Latif's system into Hochschild's system. The motivation would have been to interface between the fast network with low speed network.

Regarding claim 30, Hochschild fail to disclose the claimed invention. However, Latif discloses said network switch further comprises a network processor for each input port and each output port, wherein said network processors are configured to add an Ethernet prefix to packets in response to detecting that the packets are Fibre Channel packets and are being routed to Ethernet output ports (Fig 3 and Fig 6A).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to apply a packet processor in each input/output port for encapsulating Fibre packet into Ethernet Packet as disclosed by Latif's system into Hochschild's system. The motivation would have been to use the Ethernet network for conveying the Fibre channel packet.

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Regarding claims 40 and 54, Hochschild fails to disclose the claimed invention.

However, Latif discloses the input ports are either Fibre Channel or Gigabit Ethernet, and wherein the output ports are either Fibre Channel or Gigabit Ethernet (Fig 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to apply a method and system having the different rate ports at a switch such gigabit Ethernet or Fibre channel as disclosed by Latif's system into Hochschild's system. The motivation would have been to interface between the fast network with low speed network.

Allowable Subject Matter

10. Claims 15, 17, 19, 26-27, 38, 46-47, 49-50 and 53 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kotzur (USP 60944434) discloses a method and system for selecting a low latency path in the network switch for routing the data packet from input port to output port if the output port is available, otherwise storing the data packet at the memory for waiting the output port available.

Kozaki (USP 5838677) discloses a method and system having a congestion control.

Bennett (USP 5828475) discloses a bypass switching system.

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Herring (USP 6606326) discloses a method and system for selecting a low latency path.

Tout (USP 5991295) discloses a method and system for selecting a low latency path.

Chung (USP 5764895) discloses a method and system for selecting a low latency path.

Howe (USP 6611519) discloses a method and system for selecting a low latency path.

Chung (USP 6751225) discloses a method and system for selecting a low latency path.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven HD Nguyen whose telephone number is (703) 308-8848. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy D Vu can be reached on (703) 308-6602. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven HD Nguyen
Primary Examiner
Art Unit 2665
6/25/04